

AD-A235 524



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INSTALLATION RESTORATION PROGRAM (IRP)

McCLELLAN AIR FORCE BASE

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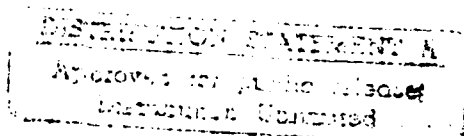
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OPERABLE UNIT B

ACTION MEMORANDUM

FINAL



PREPARED FOR:
McCLELLAN AFB / EM
McCLELLAN AFB, CALIFORNIA 95652-5990

United States Air Force
Human Systems Division (AFSC)
IRP Program Office (HSD/YAQ)
Brooks Air Force Base, Texas 78235-5501

RADIAN
CORPORATION

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HUMAN SYSTEMS DIVISION (AFSC)
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REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS N/A		
2a. SECURITY CLASSIFICATION AUTHORITY N/A		3. DISTRIBUTION / AVAILABILITY OF REPORT Limited		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE N/A				
4. PERFORMING ORGANIZATION REPORT NUMBER(S) N/A		5. MONITORING ORGANIZATION REPORT NUMBER(S) N/A		
6a. NAME OF PERFORMING ORGANIZATION Radian Corporation	6b. OFFICE SYMBOL (if applicable)	7a. NAME OF MONITORING ORGANIZATION HSD/YAQ		
6c. ADDRESS (City, State, and ZIP Code) 10395 Old Placerville Road Sacramento, CA 95827		7b. ADDRESS (City, State, and ZIP Code) Brooks AFB, TX 78235-5501		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION HSD/YAQ	8b. OFFICE SYMBOL (if applicable) N/A	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER F33615-87-D-4023		
8c. ADDRESS (City, State, and ZIP Code) Brooks AFB, TX 78235-5501		10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO	PROJECT NO.	TASK NO.
11. TITLE (Include Security Classification) McClellan AFB, California. Operable Unit B Action Memorandum (Unclassified)				
12. PERSONAL AUTHOR(S) Radian Corporation				
13a. TYPE OF REPORT Advanced Final	13b. TIME COVERED FROM 10/15/89 TO 03/29/91	14. DATE OF REPORT (Year, Month, Day) 91, 03, 29	15. PAGE COUNT 46	
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP			SUB-GROUP
19. ABSTRACT (Continue on reverse if necessary and identify by block number) This Action Memorandum documents approval of a groundwater removal action in Operable Unit B of McClellan Air Force Base, California. The removal action abates the impacts of contaminated groundwater in OU B.				
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL Mr. P. Haas and Capt. H. Thompson		22b. TELEPHONE (Include Area Code) 1-800-821-4528	22c. OFFICE SYMBOL HSD/YAQ	

PREFACE

Radian Corporation is the contractor for the Installation Restoration Program (IRP), Stage 3 Remedial Investigation/Feasibility Study (RI/FS) at McClellan Air Force Base (AFB), California. The work is being performed for the Human Systems Division (AFSC), Installation Restoration Program Office (HSD/YAQ) under Air Force Contract No. F33615-87-D-4023, Delivery Order 0011.

This Operable Unit B Action Memorandum documents approval of a removal action for the McClellan AFB Operable Unit (OU) B. The removal action abates groundwater contamination in OU B.

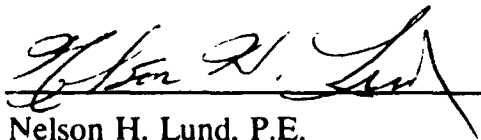
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William C. Knight -- Project Manager
Leo M. Dielmann -- Project Director

Radian acknowledges the cooperation of the McClellan AFB Office of Environmental Management. In particular, Radian acknowledges the assistance of Mr. Mario Ierardi and Mr. Gerald Robbins.

The work presented herein was accomplished between 01 October 1990 and 28 December 1990. Mr. Patrick L. Haas, Human Systems Division (AFSC), Installation Restoration Program Office (HSD/YAQ), was the Technical Project Manager. Capt. Henry Thompson, Human Systems Division (AFSC), Installation Restoration Program Office (HSD/YAQ), was the Contracting Officer's Technical Representative.

Approved:



Nelson H. Lund, P.E.

Contract Program Manager

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1.0 PURPOSE

The purpose of this Action Memorandum is to document approval of a groundwater removal action in Operable Unit (OU) B of McClellan Air Force Base (AFB), California. The removal action abates the impacts of contaminated groundwater in specific areas of OU B. Operable Unit B is the southwestern portion of McClellan AFB, and extends off-base. The impacts to public health and the environment from contaminants in OU B, including soil, soil gas, and other areas of groundwater contamination, will be addressed in the OU B Remedial Investigation/Feasibility Study (RI/FS).

2.0 SITE CONDITIONS AND BACKGROUND

Investigations of the groundwater in Operable Unit (OU) B found contamination migrating toward two water supply wells, City of Sacramento Well (CW) 132 and McClellan AFB Supply Well (BW) 18 (Radian, 1991). Base Well 18 is the principal water supply well for McClellan Air Force Base (AFB). City Well 132 is used only for emergencies. Three contaminant plumes have been identified, based on contaminant composition and historical groundwater flow direction. The contaminants in the groundwater are mostly volatile organic compounds (VOCs) that were used in industrial processes at McClellan AFB. The sources of the contaminant plumes are currently unknown.

Because this removal action was determined to be a non-time critical action, an OU B Engineering Evaluation/Cost Analysis-Environmental Assessment (EE/CA-EA) report was prepared and submitted for public review. Although different specific actions are proposed for each plume, all are interrelated. For purposes of this Action Memorandum, these component actions are considered to be one removal action.

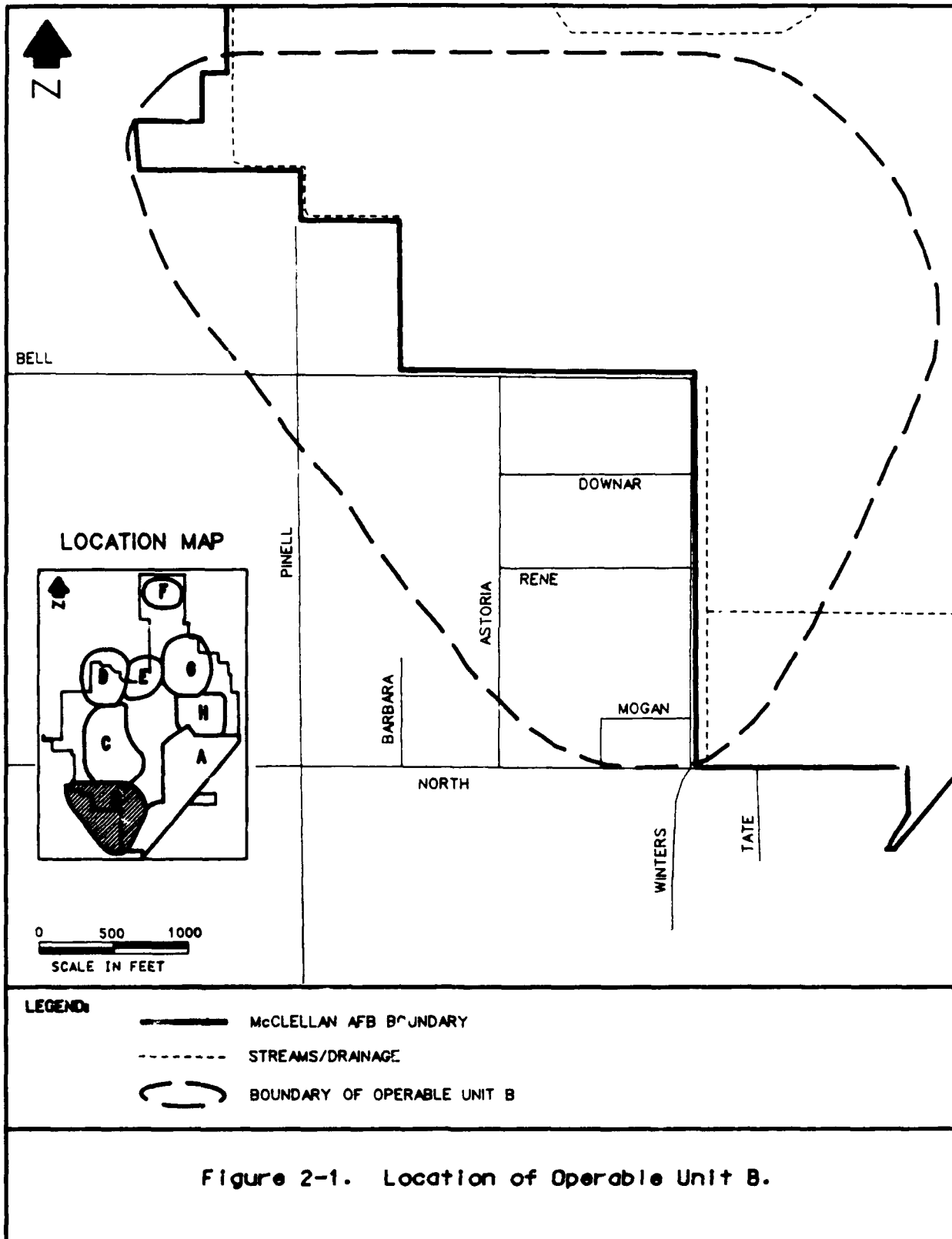
2.1 Site Description

In 1989, McClellan AFB was divided into eight operable units, to facilitate the remedial process. Operable Unit B comprises the southwestern portion of McClellan AFB and the off-base area to the south (Figure 2-1).

2.1.1 Removal Site Evaluation

Groundwater contamination at McClellan AFB is primarily the result of waste disposal practices that took place from the 1940s through the early 1980s. Contamination of the groundwater was discovered in 1979; since that time, substantial information has been collected to determine the nature, concentrations, and movement of contaminant plumes. Soil contamination has been confirmed at six sites and three study areas in OU B. Documented releases of contaminants have occurred at 13 areas in OU B (Radian, 1990c).

The particular investigations that have provided data concerning contamination in OU B are the OU B Groundwater Remedial Investigation (Radian, 1990a),



and the Engineering Evaluation/Cost Analysis-Environmental Assessment (EE/CA-EA) for OU B groundwater (Radian, 1991). Preliminary Assessments have also been conducted in OU B (Radian, 1990c). The areal and vertical extent of groundwater contamination will continue to be monitored in the Groundwater Sampling and Analysis Program (GSAP).

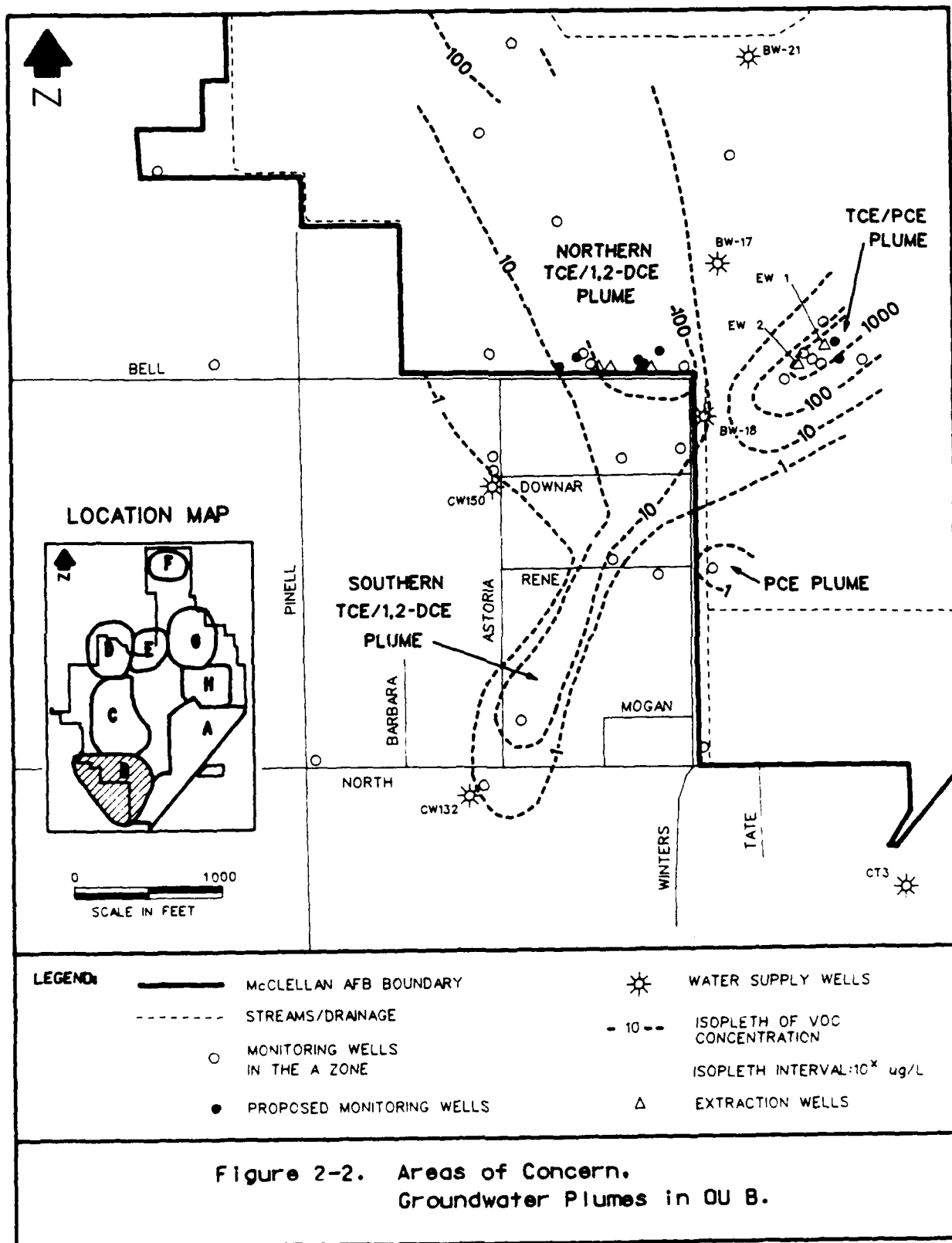
Three contaminant plumes have been identified in OU B (see Figure 2-2): a trichloroethene/tetrachloroethene (TCE/PCE) plume, a widespread trichloroethene/1,2-dichloroethene (TCE/1,2-DCE) plume, and a PCE plume. For purposes of this removal action, the TCE/1,2-DCE plume has been divided into two sections, northern and southern, by an imaginary line running east-west through Base Well 18. The northern TCE/1,2-DCE plume is characterized by VOC concentrations that locally are greater than 100 microgram per liter ($\mu\text{g/L}$), and by its location primarily beneath on-base areas; the southern TCE/1,2-DCE plume is characterized by VOC concentrations less than 100 $\mu\text{g/L}$ and by its location beneath off-base areas.

Historical groundwater flow directions and the types of contaminants in the plumes indicate each plume has a different source. The likely source of the TCE/PCE plume is the Building 666 area; Building 666 was an electroplating facility that operated from 1957 to 1980. The building was dismantled in 1988. The source of the TCE/1,2-DCE plume is apparently to the north of OU B, probably in OU C. The source of the PCE plume is unknown, but it is apparently not the same as those of the other two plumes.

2.1.2 Physical Location

McClellan AFB is an Air Force Logistics Center located approximately seven miles northeast of downtown Sacramento, California. It comprises 2,952 acres within irregularly configured boundaries. McClellan AFB currently employs approximately 17,000 personnel, including 3,500 military personnel and 13,000 civilians. The off-base portion of OU B is primarily low-density residential property, with some industrial and commercial parcels.

Surface water runoff on the northwestern part of OU B flows into Magpie Creek, a channelized natural stream that flows along the northern boundary of the OU. Magpie Creek drains off base to the west. Runoff from the southeastern part of OU B flows to Arcade Creek, south of McClellan AFB, through artificial drainage ditches.



DOI1 P2A 4/23/91

The groundwater table in OU B is about 100 feet below ground surface (BGS). Beneath that, six water-bearing, or geohydrologic, zones have been identified; these are designated A through F from shallowest to deepest. The highest concentrations of contaminants are found in the A zone, approximately 100 to 135 feet BGS.

Currently, the only active water supply well in OU B is BW-18. Base Well 18 pumps approximately one million gallons per day and has a carbon filtration system to remove contaminants from the groundwater it pumps before the water is distributed to on-base users.

City Well 132 was taken out of active service in June 1989 because of contaminants moving toward it. At the request of the Air Force, the well will remain out of active service, and be used only in emergencies, such as a fire.

2.1.3 Site Characteristics

McClellan AFB is a federal facility under the jurisdiction, custody, and control of the Department of Defense, which is the lead agency in this action. The proposed removal action is a first removal action addressing groundwater contamination in OU B.

The portion of McClellan AFB now designated OU B has been in use since 1939. The on-base portion of OU B consists primarily of open storage and warehouse facilities, maintenance facilities, and underground tanks and pipelines. Other facilities that were located in OU B, but have now either been dismantled or decommissioned, include four waste disposal facilities, four waste treatment plants, a radiochemistry laboratory, and a plating shop (Building 666).

When McClellan AFB wells are not pumping, groundwater flows in a generally south/southwesterly direction. In 1990, BW-18 pumped at an average rate of one million gallons or more every day. When BW-18 is pumping at that rate, it controls much of the groundwater movement to a depth of 360 feet beneath OU B. Data indicate BW-18 draws groundwater from distances of 3,500 feet or more to the northwest, north, northeast, and east in the A through D zones. The well also draws in groundwater from as far away as 1,500 feet downgradient to the southwest in the A zone, and from 2,500 feet to the southwest in the B and C zones.

2.1.4 Release or Threatened Release into the Environment of a Hazardous Substance, Pollutant or Contaminant

Groundwater in OU B is regularly sampled and analyzed for contamination. The VOCs TCE, total 1,2-DCE, 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), PCE, chloroform, and methylene chloride have been detected in monitoring wells in OU B for several years. No single well has had detectable concentrations of all of the compounds, but TCE is detected most frequently. Concentrations detected during December 1989 and the first quarter of 1990 were used for evaluating plume migration and removal action alternatives in the OU B EE/CA-EA; those analytical results are shown in Table 2-1. All detected VOCs are hazardous substances, as defined by section 101(14) of CERCLA.

Detected concentrations of total VOCs (that is, the combined total for all of the VOCs in the plume) in the TCE/PCE plume range from 10 to over 10,000 $\mu\text{g/L}$. For the northern TCE/1,2-DCE plume, detected total VOC concentrations range from 1 to over 100 $\mu\text{g/L}$. In the southern TCE/1,2-DCE plume, total VOC concentrations are less than 100 $\mu\text{g/L}$; in much of the plume, concentrations range from 1 to 10 $\mu\text{g/L}$. In the PCE plume, detected total VOC concentrations range from 1 to 6.5 $\mu\text{g/L}$.

The vertical extent of contamination also varies within each plume. The TCE/PCE plume has been detected in the A and B geohydrologic zones. The northern TCE/1,2-DCE plume has been detected in the A, B, C, D, and E zones; the southern TCE/1,2-DCE plume has been detected in the A, B, and C zones. The PCE plume has been detected on base in the A and B zones.

Several metal ions have been detected in the OU B groundwater samples (Table 2-2). All the detected metal ions may occur naturally in groundwater. There is insufficient data to distinguish between naturally occurring metals and possible contamination from base activities. However, the metal ions concentrations detected have not consistently exceeded established Maximum Contaminant Levels (MCLs). When considered alone, metal ion constituents would classify the groundwater as suitable for drinking water supplies.

TABLE 2-1. ANALYTES DETECTED BY U.S. EPA METHOD 8010 IN OU B MONITORING WELL SAMPLES COLLECTED IN THE FIRST QUARTER 1990 AND SUPPLEMENTED BY FOURTH QUARTER 1989 AND MAY 1990 SAMPLES

		Concentration (ug/L)														
		"A" GEOHYDROLOGIC ZONE MONITORING WELLS														
Compound	Action Level or MCL	DHS														
		Date Sampled														
Well		MW-7	MW-11A ^a	MW-41S	MW-65	MW-121	MW-135	MW-139	MW-145	MW-150	MW-153	MW-155	MW-157	MW-158	MW-159	MW-164
Date Sampled		02/90	01/90	01/90	02/90	01/90	01/90	01/90	01/90	02/90	02/90	02/90	02/90	02/90	12/89	01/90
1,1-Dichloroethene	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	130	ND	ND	ND	ND	ND	2.5	6.5	ND	1400	210	1.3	ND
1,2-Dichloroethene	16	34	4	ND	ND	3.5	28	0.51	ND	3.5	ND	ND	ND	42	45	17
Trichloroethene	5	47	2.4	1800	110	ND	19	110	1.9	ND	150	ND	5400	1500	85	25
Chloroform	100	ND	ND	ND	ND	ND	0.91	ND	ND	ND	ND	ND	ND	ND	3.9	1.5
1,1,1-Trichloroethane	200	2.8	ND	ND	ND	0.47	ND	ND	ND	ND	ND	ND	ND	29	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.54	ND	22	ND	ND
Total VOC	--	83.8	6.4	1930	110	0.47	24.41	158	2.41	2.5	160	0.54	6800	1803	135.2	47
Ratio of Concentrations of TCE/1,2-DCE	--	1.38	0.6	--	--	--	5.43	3.93	3.73	--	42.86	--	--	35.71	1.89	1.47

		Concentration (ug/L)														
		"A" GEOHYDROLOGIC ZONE MONITORING WELLS														
Compound	Action Level or (MCL)	DHS														
		Date Sampled														
Well		MW-1000	MW-1011	MW-1015	MW-1016	MW-1020	MW-1021	MW-1023	MW-1044	MW-1049	MW-1053	MW-1054	MW-36A ^a			
Date Sampled		02/90	02/90	01/90	01/90	02/90	02/90	01/90	01/90	02/90	02/90	10/89	05/90			
1,1-Dichloroethene	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND			
Tetrachloroethene	5	ND	ND	ND	ND	ND	0.84	ND	ND	ND	ND	0.17	ND			
1,2-Dichloroethene	16	ND	ND	ND	ND	ND	ND	ND	ND	5.7	0.49	0.20	74			
Trichloroethene	5	ND	ND	ND	ND	0.43	13	ND	3.3	13	0.66	1.1	65			
Chloroform	100	ND	ND	ND	ND	ND	0.42	ND	7.6	ND	ND	0.19	9.7			
1,1,1-Trichloroethane	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
Methylene Chloride	NE	2.1	ND	ND	ND	ND	ND	ND	ND	0.41	ND	ND	ND			
Total VOC	--	2.1	ND	ND	ND	0.43	14.26	ND	10.9	19.25	1.15	1.66	ND			
Ratio of Concentrations of TCE/1,2-DCE	--	--	--	--	--	--	--	--	--	2.28	1.35	5.5	0.88			

Continued--

ND = Nothing Detected
NE = Action level not established
a = Data for this sample have not undergone quality assurance - quality control validation.

TABLE 2-1. (Continued)

		Concentration (µg/L)																	
		"B" Geohydrologic Zone Monitoring Wells																	
Well		MW-11B ^a	MW-23D	MW-36B ^a	MW-63	MW-64	MW-66	MW-134	MW-140	MW-146	MW-151	MW-156	MW-165	MW-1022	MW-1025	MW-1045	MW-1050	MW-1055	
Date Sampled		03/90	01/90	05/90	01/90	02/90	02/90	02/90	1/90	2/90	02/90	02/90	02/90	11/89	02/90	01/90	02/90	10/89	
DHS																			
Action Level																			
or (MCL)																			
Compounds																			
1,1-Dichloroethene	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.1	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichloroethene	16	ND	ND	2.4	43	ND	ND	0.21	48	ND	ND	52	57	0.49	ND	1.9	0.21	ND	
Trichloroethene	5	ND	ND	1.9	110	ND	ND	2.9	120	ND	ND	100	170	5.9	ND	ND	ND	ND	
Chloroform	100	ND	ND	0.25	ND	ND	ND	ND	ND	ND	ND	ND	3.6	ND	ND	ND	ND	ND	
1,1,1-Trichloroethane	200	ND	ND	ND	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.47	ND	0.35	ND	
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Methylene Chloride	NE	0.72	ND	ND	ND	ND	ND	1.9	ND	ND	0.42	ND	ND	ND	ND	ND	ND	ND	
Total VOC	--	1.08	ND	0.79	158.2	ND	1.9	3.1	168	ND	6.52	152	230.6	6.39	0.47	1.9	0.56	ND	
Ratio of Concentrations	--	--	--	--	2.56	--	--	--	2.5	--	--	1.92	2.98	12.04	--	--	--	--	
of TCE/1,2-DCE																			

		Concentration (µg/L)													
		"C" GEOHYDROLOGIC ZONE MONITORING WELLS													
Well		MW-36C ^a	MW-132	MW-141	MW-147	MW-152	MW-154	MW-166	MW-1046	MW-1051	MW-1056	MW-181			
Date Sampled		05/90	01/90	01/90	02/90	02/90	02/90	11/89	02/90	02/90	12/89	12/89			
DHS															
Action Level															
or (MCL)															
Compounds															
1,1-Dichloroethene	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.5	0.32	2	8.7	ND	ND	ND	ND	ND	ND	0.41	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene	16	12	47	19	ND	ND	40	6.2	20	2	4.6	ND	ND	ND	ND
Trichloroethene	5	54	120	160	ND	0.83	100	0.19	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	ND	2.5	ND	ND	ND	ND	ND	0.35	0.47	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	ND	ND	13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	NE	ND	ND	ND	ND	ND	ND	ND	1.5	ND	1.5	ND	ND	ND	ND
Total VOC	--	4.5	171.5	200.7	ND	0.83	140	28.24	3.88	6.1	6.1	ND	ND	ND	ND
Ratio of Concentrations	--	--	2.55	8.42	--	--	2.5	3.22	2.00	--	--	--	--	--	--
of TCE/1,2-DCE															

Continued--

NE = Action level not established
 ND = Nothing Detected
 a = Data for this sample have not undergone quality assurance - quality control validation.

TABLE 2-1. (Continued)

"D" GEOHYDROLOGIC ZONE MONITORING WELLS										"E" GEOHYDROLOGIC ZONE MONITORING WELLS										
Well	MW-148 MW-162 MW-167 MW-1047 MW-1052 MW-1057										MW-149 MW-163 MW-168 ^b MW-1048									
Date Sampled	02/90	12/89	12/89	2/90	02/90	12/89	02/90	12/89	02/90	02/90	01/90	01/90	01/90	01/90	02/90					
Concentration (µg/L)																				
Compounds	DHS																			
Action Level	or (MCL)																			
1,1-Dichloroethene	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	ND					
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
1,2-Dichloroethene	16	ND	6.9	30	ND	ND	ND	ND	ND	ND	0.7	22	57	ND	ND					
Trichloroethene	5	7.2	39	79	ND	ND	ND	ND	ND	0.98	7.3	57	ND	ND	ND					
Chloroform	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
1,1,1-Trichloroethane	200	0.39	0.37	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
Methylene Chloride	NE	0.72	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
Total VOC	--	10.81	46.27	109	ND	ND	ND	ND	ND	0.98	10.1	79	ND	ND	ND					
Ratio of Concentrations	--	--	5.6	2.63	--	--	--	--	--	--	10.43	2.59	--	--	--					
of TCE/1,2-DCE																				

NE = Action level not established

ND = Nothing Detected

b = Well initially designated as "E" zone probably was constructed in the lower part of "D" zone.

SOURCE: Radian, 1991.

TABLE 2-2. TRACE METAL ANALYTES¹ DETECTED BY U.S. EPA METHOD 6010 IN OU B
MONITORING WELL SAMPLES, FOURTH QUARTER 1989 THROUGH FIRST
QUARTER 1990

A GEOHYDROLOGIC ZONE MONITORING WELLS						
Metal	Well No.:	MW-135	MW-155	MW-158	MW-1011	MW-1023
	Date Sampled:	10/89	09/89	10/89	11/89	01/90
						MW-1054 10/89
MCL		Concentration (mg/L)				
Barium	1	0.06	0.02	0.031	ND	0.03
Boron	NE	0.23	0.28	0.30	ND	0.30
Chromium	0.05	0.013	ND	ND	ND	0.010
Copper	NE	0.023	0.17	ND	ND	0.023
Vanadium	NE	0.031	0.02	0.022	ND	0.022
Zinc	NE	0.010	0.068	0.014	ND	0.012

(Continued)

TABLE 2-2. (Continued)

B GEOHYDROLOGIC ZONE MONITORING WELLS								
Metal	Well No.: Date Sampled:	MW-11B ² 03/90	MW-66 02/90	MW-134 10/89	MW-146 11/89	MW-151 11/89	MW-156 09/89	MW-1045 10/89
	MCL	Concentration (mg/L)						
Barium	I	0.043	0.026	0.053	0.022	0.034	0.043	0.048
Boron	ND	NA	0.40	0.29	0.41	0.20	0.28	0.21
Chromium	0.05	0.014	ND	0.012	0.007	0.010	0.011	0.018
Copper	NE	0.016	ND	0.008	0.016	0.070	0.11	ND
Vanadium	NE	0.027	0.017	0.026	0.021	0.027	0.025	0.025
Zinc	NE	0.017	0.039	0.012	0.66	0.033	0.035	0.067

Metal	Well No.: Date Sampled:	MW-1050 11/89	MW-1055 10/89
	MCL	Concentration (mg/L)	
Barium	I	0.024	0.019
Boron	NE	0.37	0.29
Chromium	0.05	0.025	ND
Copper	NE	0.033	ND
Vanadium	NE	0.026	0.024
Zinc	NE	1.10	0.036

(Continued)

TABLE 2-2. (Continued)

C GEOHYDROLOGIC ZONE MONITORING WELLS				
Metal	Well No.: Date Sampled:	MW-147 02/90	MW-152 11/89	MW-1051 02/90
	MCL	Concentration (mg/L)		
Barium	1	0.066	0.032	0.012
Boron	NE	0.39	0.44	0.32
Chromium	0.05	ND	0.008	0.017
Copper	NE	0.020	.034	0.021
Vanadium	NE	0.024	0.020	0.011
Zinc	NE	0.062	0.035	0.16

D GEOHYDROLOGIC ZONE MONITORING WELLS				
Metal	Well No.: Date Sampled:	MW-1047 02/90	Concentration (mg/L)	
	MCL			
Barium	1	0.044		
Boron	NE	0.33		
Chromium	0.05	ND		
Copper	NE	0.008		
Vanadium	NE	ND		
Zinc	NE	0.010		

¹ Major metal analytes (e.g., aluminum, calcium, etc.) were detected in the analysis, but are not presented here. All concentrations of major metals were below established EPA MCLs. Other trace metals not detected.

² Data have not been validated.

MCL = Maximum contaminant level.

NA = Not analyzed.

NE = Not established.

ND = Not detected.

SOURCE: Radian, 1991.

2.1.5 National Priority List Status

McClellan AFB was named to the National Priority List (NPL) in July 1987. The NPL is the Environmental Protection Agency's (EPA's) list of priority releases and sites for long-term remedial evaluation and response as directed by 42 U.S.C. Sec. 9605 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The Remedial Investigation of OU B is scheduled to begin in spring of 1991. Remedial action in OU B is expected to begin in 1994.

2.2 Other Actions to Date

Two response-type actions were previously implemented in OU B: replacing private water supply wells for off-base residents with an alternate city water supply; and dismantling an electroplating facility (Building 666) on base to slow the migration of soil contaminants to groundwater. A third response action currently being implemented is the OU B Expedited Response Action (ERA), described in detail in Section 5.1. The ERA is one of the actions proposed by the OU B EE/CA-EA. This action has already been selected, after required public and regulatory participation and consultation opportunities; designed; and constructed. Ongoing actions include Remedial Investigation/Feasibility Study (RI/FS) activities performed as part of the Remedial Response Program at McClellan AFB.

2.2.1 Previous actions

In 1986, McClellan AFB began supplying municipal drinking water connections to approximately 550 residences west of the base, because of localized contamination in private wells. All of the off-base portion of OU B was included in the response action area. Water connections were completed in August 1987. Today, residential wells are no longer in use in OU B, and the County of Sacramento has prohibited installation of any new potable water supply wells in the area.

The purpose of providing municipal water supplies to residents near McClellan AFB was to decrease the potential for exposure to contaminated groundwater by residents in the affected areas, and decrease the migration of contaminants in the subsurface near private water wells. By supplying an alternative source of water, the

need to use groundwater for potable water supplies was eliminated. This removal action was taken as part of the Air Force's Installation Restoration Program.

The other response action already taken in OU B was the dismantling of Building 666. As stated previously, Building 666, a former electroplating facility, is the likely source of the TCE/PCE plume. Soil contamination had been detected to depths of 80 feet BGS beneath the building.

Dismantlement of Building 666 was completed in March 1988. Industrial Wastewater Treatment Plant No. 4, located nearby, had served as a pretreatment facility for wastes generated at Building 666, and was also dismantled. Along with the buildings, all aboveground piping, valves, pumps, and tanks were removed. The concrete foundations of the facility were left intact, as were the walls and roof. Trenches and floor drains were filled with concrete, and sumps were covered with metal caps to keep rainwater and runoff from entering.

The dismantling of Building 666 was undertaken to prevent the migration of contaminants in the soil to groundwater. The action was taken as part of the Air Force's Installation Restoration Program. Soils beneath Building 666 and adjacent areas will be further investigated in the comprehensive OU B RI.

2.2.2 Current Actions

Ongoing and proposed remedial response program activities at McClellan AFB are described in the McClellan AFB Comprehensive CERCLA Workplan (CCW) (Radian, 1990b). These activities include the regular monitoring of the groundwater beneath McClellan AFB (GSAP), the basewide Preliminary Groundwater Operable Unit Remedial Investigation, preliminary assessments of potential contaminant sources in OU A, and community relations activities. The OU B RI is scheduled to begin in 1991. All of these activities are governed by the Interagency Agreement between the Air Force, U. S. Environmental Protection Agency (U.S. EPA), and California Department of Health Services (DHS).

2.3 Federal, State, and Local Authorities' Roles

Under and pursuant to the Federal Facilities provisions of CERCLA (42 U.S.C. Sec. 9620), the Defense Environmental Restoration Program (DERP) (DERP at 10 U.S.C. Secs. 2701-2707), Executive Order 12580 (52 FR 2923, 29 January 1987) the

National Contingency Plan (NCP at 40 CFR Part 300), and the McClellan AFB Interagency Agreement (IAG, effective 2 May 1990), the Air Force and McClellan AFB are authorized to act on behalf of the President and Secretary of Defense as the lead agency for all response and environmental restoration activities conducted at its facility. Similarly, under and pursuant to the same authorities, the U.S. EPA and DHS act as support agencies for all response activities. The respective roles of lead and support agencies are specified in these authorities.

3.0 THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

For purposes of taking response actions, CERCLA/SARA gives high priority to facilities where releases of hazardous substances have closed drinking water wells or contaminated a principal drinking water supply (42 U.S.C. Sec. 9618). The National Oil and Hazardous Substances Contingency Plan (NCP) lists as one of the criteria for a removal action the "actual or potential contamination of drinking water supplies" (40 CFR 300.415 (b)(2)(ii)). The groundwater in Operable Unit (OU) B at McClellan (AFB) is in an aquifer that is a drinking water source off- and on-base and has been found to contain volatile organic compounds (Section 2.1.4) in excess of U.S. EPA Maximum Contaminant Levels (MCLs). The contamination is migrating toward two water supply wells, City of Sacramento Well (CW) 132, and McClellan AFB Supply Well (BW) 18. An action is being implemented to remove contamination. Delaying action would increase response action costs and complicate the remediation.

A baseline risk assessment was conducted in 1990 to determine the potential for any health risks from the contaminants in the groundwater in OU B (Radian, 1990b). This assessment found that some health risks--both carcinogenic and non-carcinogenic--would be posed to users of the groundwater if no action were taken to control the migration of the existing contaminants in the groundwater (see Tables 3-1 and 3-2). Anticipated risks would be somewhat greater for users of water from CW-132 than for users of BW-18, because BW-18 has a carbon filtration system that removes contaminants to below detectable levels. No similar pretreatment process exists for CW-132. No contamination was ever found in CW-132 in analyses ordered by the City of Sacramento.

TABLE 2-1. SUMMARY OF ESTIMATED CARCINOGENIC RISKS BY EXPOSURE SCENARIO

Pathway/Scenario	Estimated Carcinogenic Risk	
	Average	Upperbound
BW-18		
Residential	9×10^{-7}	8×10^{-6}
3-Year Tour-of-Duty	3×10^{-7}	9×10^{-7}
Occupational	1×10^{-6}	2×10^{-6}
CW-132		
Residential	3×10^{-6}	1×10^{-5}

SOURCE: Radian, 1991

TABLE 3-2. SUMMARY OF NONCARCINOGENIC RISKS BY EXPOSURE SCENARIO

Scenario	Hazard Index			
	Children		Adults	
	Average	Upperbound	Average	Upperbound
Chronic				
BW-18				
Residential	0.2	0.5	0.09	0.2
3-Year Tour-of-Duty	0.2	0.3	0.07	0.1
Occupational	-	-	0.05	0.09
CW-132				
Residential	0.2	0.4	0.05	0.08
Subchronic				
BW-18				
Residential	0.2	0.4	0.08	0.1
3-Year Tour-of-Duty	0.2	0.4	0.08	0.1
Occupational	-	-	0.05	0.1

SOURCE: Radian, 1991.

4.0 ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from these sites, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

5.0 PROPOSED ACTIONS AND ESTIMATED COSTS

To develop the removal actions, the groundwater contamination in Operable Unit (OU) B has been divided into three plumes based on contaminant concentrations and groundwater flow direction (see Figure 2-2): a trichloroethene/tetrachloroethene (TCE/PCE) plume, a TCE/1,2-dichloroethene (1,2-DCE) plume, and a PCE plume. The TCE/1,2-DCE plume has been subdivided into northern and southern components. Proposed actions for each of these plumes differ. Together, however, these actions constitute the proposed removal action for OU B. The objectives of the removal action for the plumes are to:

- Reduce the potential for health risks that would result if groundwater containing greater contaminant concentrations is allowed to continue migrating toward on-base and off-base water supply wells;
- Prevent environmental impacts that could result from increases in the horizontal and vertical extent of contaminant concentrations beneath on-base and off-base areas;
- Implement removal actions that will be consistent with future remedial actions.

The proposed actions and costs for each plume are discussed separately below.

Applicable or Relevant and Appropriate Requirements (ARARs)

A determination of ARARs has been made for this action. The selected ARARs address air and surface water quality. Groundwater quality is deferred to the OU B RI/FS. The ARARs specific to each action are evaluated in the respective section for each plume. All selected actions will attain identified ARARs to the maximum extent practicable under the exigencies of the situation.

As ARARS relate only to substantive standards, procedural requirements or laws such as the National Environmental Policy Act (NEPA) are not ARARs. The Air Force, as a matter of policy, currently complies with NEPA in its implementation of response actions conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Defense Environmental

Restoration Program (DERP). An environmental assessment was completed as part of the Engineering Evaluation/Cost Analysis (EE/CA) for these removal actions and based thereon, a Finding of No Significant Impact document has been prepared separately from this Action Memorandum.

5.1 TCE/PCE Plume Actions

An Expedited Response Action (ERA) was determined in December 1989 to be appropriate for the conditions caused by the TCE/PCE plume. Contaminants in concentrations greater than 1,000 micrograms per liter ($\mu\text{g/L}$) are migrating toward Base Well (BW) 18. This action was accelerated as an expedited removal because a planning period of less than six months existed before on-site activities had to be initiated due to the magnitude and immediacy of the threat. A separate public comment period was conducted from 15 April 1990 to 15 May 1990 for this removal action. No comments were received from the public. This removal action is addressed by and documented in the context of this Action Memorandum.

5.1.1 Proposed Actions

The proposed actions for the TCE/PCE plume are:

- Extract groundwater contaminated with volatile organic compounds (VOCs) in concentrations greater than 1,000 $\mu\text{g/L}$ from the A zone, with two extraction wells (Figure 2-2);
- Treat the extracted water with aqueous-phase granular activated carbon (GAC) at a treatment plant to be built nearby; and
- Dispose of the treated effluent to the McClellan Air Force Base (AFB) Industrial Wastewater Line (IWL).
- Construct two monitoring wells (Figure 2-2) to monitor the effectiveness of the extraction system, along with other existing monitoring wells.

Extracting groundwater with contaminant concentrations greater than 1,000 $\mu\text{g/L}$ will: minimize further degradation of the groundwater by removing contaminants before they can migrate further, either horizontally or vertically; minimize potential

health risks to users of water from BW-18; and minimize the possible shutdown of BW-18. Further operation of the well as a drinking water source will be reassessed by the Air Force and appropriate support agencies.

Together, the two extraction wells will pump at a rate of 20 gallons per minute (gpm). Extraction Well 1, located closest to the foundation of Building 666, will initially extract groundwater with contaminant concentrations greater than 10,000 $\mu\text{g/L}$. Extraction Well 2, located 200 feet to the southwest, will initially extract groundwater with contaminant concentrations greater than 1,000 $\mu\text{g/L}$. Together, these two wells will remove contaminated groundwater before it reaches BW-18.

The local treatment plant will remove contaminants to less than detectable levels, and dispose of treated water to the McClellan AFB Industrial Wastewater Line (IWL). From there, the treated water will be transported to the McClellan AFB Industrial Wastewater Treatment Plant (IWTP). The IWTP will treat the water again before discharging it to the sanitary sewer. The sanitary sewer line connects to the Sacramento Regional County Sanitation District (SRCSD) sewer interceptor line, which in turn carries wastewater to the SRCSD Wastewater Treatment Plant.

The removal action for the TCE/PCE plume was made on the basis of preliminary engineering and rough cost estimates, with a tendency to select a proven and familiar process that would require little or no permitting and could be implemented quickly. Construction of the treatment plant at McClellan AFB is readily implementable. The existing OU D Groundwater Treatment Plant (GWTP) has two carbon adsorption units and two biological reactors that can be used at the new facility. The use of existing equipment will reduce the capital cost of the removal action. Once complete, the extraction and treatment system will immediately start to remove and treat contaminated groundwater.

Effectiveness of the treatment system will be monitored by sampling and analysis of existing monitoring wells, and of two new monitoring wells that will be constructed near the extraction wells. Samples will be analyzed by U. S. EPA Methods 8010 and 6010.

The majority of the soils generated by this action will contain very small amounts of hazardous materials. These soils will be safely managed on base until either on-base treatment and/or disposal options are available. For soils contaminated above these levels, may be transported to a licensed off-base facilities for proper disposal only

if such transport is consistent with and appropriate under the limitations for off-site disposal as established by CERCLA, the NCP, and the U.S. EPA's off-site policy on off-site response actions. Appropriate state and local officials have been notified of the intended removal action and ultimate disposal of the treated groundwater, and have concurred with the action.

Contribution to Remedial Performance

The ERA will contribute to long-term remedial actions in OU B by controlling a contaminant plume near the source, and by preventing contaminants from migrating to larger volumes of groundwater, where they would pose a greater problem in the future. Extracting contaminated groundwater close to the source of the contamination is more efficient and cost effective than pumping larger volumes of groundwater with lower contaminant concentrations. Removing these higher concentrations will allow BW-18 to continue operating. The threat to BW-18 requires the most immediate attention before long-term cleanup begins. Base Well 18's current extraction rate controls much of the groundwater flow in OU B, and thus controls contaminant migration. The continued operation of BW-18 is a factor in the proposed removal actions for the other plumes in OU B.

Remedial actions for OU B have not yet been formulated. Such actions might include both source control measures, such as removing primary contaminant sources, and migration control measures, such as groundwater extraction. Further groundwater extraction systems may be installed, although such technologies as subsurface barriers are considered inappropriate, due to the depths of the affected groundwater. The OU B RI/FS will further characterize the nature and extent of contamination in OU B, and evaluate possible remedial actions.

Description of Alternative Technologies

The alternatives evaluated for the ERA were limited to extraction and treatment methods. Migration barriers and other technologies that did not remove and treat contaminated groundwater were eliminated from consideration prior to the evaluation.

Engineering Evaluation/Cost Analysis-Environmental Assessment (EE/CA-EA)

Removal action alternatives were evaluated in the OU B EE/CA-EA (Radian, 1991). Alternatives to extraction wells were eliminated because of the depth from which it is necessary provide a barrier to migration of contaminated groundwater. Alternative groundwater treatment systems evaluated included air stripping, ultraviolet (UV)/ozone/peroxide treatment, and piping to the GWTP. Disposal alternatives for treated groundwater included discharging to the sanitary sewer, to surface water, or reinjection. A no-action alternative was also evaluated, as required by the EA. The discussion and evaluation of the alternatives in the EE/CA-EA is hereby incorporated by reference.

The ERA alternatives were proposed and discussed with the support agencies on 09 January 1990. A technical letter (Proposal/Notification for an Expedited Removal Action Near Building Site 666 in the Groundwater Operable Unit B, Department of the Air Force, 23 January 1990) was transmitted to the agencies following the meeting. The proposal was subsequently agreed to by all parties.

Applicable or Relevant and Appropriate Requirements (ARARs)

The ARARs considered appropriate to groundwater remedies evaluated for the McClellan AFB OU B removal actions are those associated with potential groundwater treatment and disposal actions, and managing treatment residuals. The ARARs that have been identified for the TCE/PCE plume actions are:

- Clean Water Act pretreatment standards for discharges to the SRCSD Publicly Owned Treatment Works (POTW);
- Clean Air Act (CAA) Primary and Secondary Ambient Air Quality Standards;
- National Ambient Air Quality Standards (NAAQS);
- National Emission Standards for Hazardous Air Pollutants;
- California Ambient Air Quality Standards;

- SRCSD Sanitary Sewer Fees and Discharge Requirements; and
- Sacramento Metropolitan Air Quality Management District Requirements.

The selected action will comply with the identified ARARs to the maximum extent practicable under the exigencies of the situation. These actions will be protective of human health and the environment.

Project Schedule

Construction of the ERA treatment facility began in September 1990, and is expected to take four months to complete. Once complete, the ERA extraction system will immediately begin to extract and treat contaminated groundwater.

5.1.2 Estimated Costs

Capital costs for construction of the ERA removal action is estimated to be \$950,000; operations and maintenance costs are estimated to be \$190,000 annually. These costs assume no transfer and disposal of contaminated soil or drill cuttings generated during the construction to a Class I facility, and no need to increase personal protection for employees involved in construction from Level D to Level C during well installation or construction of the pipeline. Should either of those activities be required, additional costs are estimated to be \$95,000 and \$18,000, respectively.

5.2 Northern TCE/1,2-DCE Plume Actions

The northern TCE/1,2-DCE plume is that portion of the plume north of an imaginary east-west line running through BW-18. It is distinguished from the southern TCE-1,2-DCE plume by its higher VOC concentrations (exceeding 100 µg/L).

5.2.1 Proposed Actions

The proposed actions for the northern TCE/1,2-DCE plume are to:

- Extract groundwater with three extraction wells (Figure 2-2), one each in the A, B, and C zones;

- Transport contaminated groundwater to the Groundwater Treatment Plant (GWTP) for treatment;
- Continue to pump BW-18 for the hydrologic control it exerts on the aquifers;
- Abandon five unused supply wells that may be acting as vertical conduits for contaminants, in accordance with approved state guidelines; and
- Construct six monitoring wells in the plume to monitor the effectiveness of the extraction well field (Figure 2-2).

The proposed actions are appropriate because they will prevent higher concentrations of contaminants from migrating to BW-18, thereby minimizing future health risks; control the migration of contaminants to the south, preventing degradation of larger volumes of groundwater; and intercept a plume of VOCs with concentrations exceeding 100 $\mu\text{g/L}$ from migrating toward the CW-132 and other City of Sacramento wells to the south.

One extraction well will be built in each of the A, B, and C geohydrologic zones. Together, the wells will pump at a rate of 155 gpm, and will initially capture groundwater with contaminant concentrations exceeding 100 $\mu\text{g/L}$.

Design the construction of the pipeline to the OU C extraction system and GWTP expected to take one year to complete. Extracted groundwater will be pumped from the wells to a groundwater holding tank, and from there to the GWTP. The pipeline will connect with the existing pipeline from the OU C extraction system to the GWTP. The GWTP uses five processes to treat influent groundwater: flow equalization/storage, air stripping, GAC treatment, off-gas incineration, and caustic scrubbing. The plant current has excess capacity to handle flow from OU B.

The proposed action was selected because it uses proven treatment technologies, has demonstrated successful treatment of similarly contaminated groundwater, and has the potential to become part of a longer term remedy.

Six monitoring wells will be installed in the plume, two each in the A, B, and C geohydrologic zones. The new wells, along with existing monitoring wells in OU

B, will monitor the effectiveness of the extraction system by measuring the hydraulic gradient and analysis of groundwater quality. Groundwater samples will be analyzed by U. S. EPA Methods 8010, 8020, and 6010.

Part of the proposed removal action is the continued pumping of BW-18 at its 1990 rate of one million gallons per day. Whereas the extraction wells will control the migration of contaminant plumes with concentrations exceeding 100 $\mu\text{g/L}$, pumping BW-18 will prevent lower concentrations of contaminants from migrating past the McClellan AFB boundary. The GAC wellhead treatment system at BW-18 will continue to remove VOCs before the water is distributed on base.

The EE/CA-EA proposed an interim solution for the Northern TCE/1,2-DCE plume consisting of discharging extracted groundwater to the Sacramento County sanitary sewer line for treatment at the Sacramento Regional County Sanitation District (SRCSD) Publicly Owned Treatment Works (POTW). Discharging water to the sanitary sewer line was proposed to expedite groundwater extraction. Construction of the pipeline to the GWTP was originally estimated to require one to three years. This construction term is now estimated to require less than one year.

Public responses to the EE/CA-EA expressed concern about discharging extracted groundwater to the sanitary sewer line. The comments identified leaking sewer lines, volatilization of contaminants, and inadequate treatment capability at the SRCSD POTW as the basis for concern. Given the revised construction term and the public responses to the EE/CA-EA, a change to a component of the selected alternative is being implemented. This change is significant but is considered a logical outgrowth of information available to the public. The change consists of eliminating the sanitary sewer discharge option, and will delay the start of groundwater extraction approximately eight months.

The actions described above for the northern TCE/1,2-DCE plume will control the horizontal migration of the plume. Actions will also be taken to control the vertical extent of contamination. Five unused on-base water supply wells (BW-3, BW-6, BW-17, BW-19, and an unnumbered well, located in OU B and OU C, may be providing conduits for vertical migration between geohydrologic zones. To prevent this, the wells will be located and properly abandoned, as part of the McClellan AFB Well Abandonment Program.

The majority of the soils generated by this action will contain very small amounts of hazardous materials. These soils will be safely managed on base until either on-base treatment and/or disposal options are available. For soils contaminated above these levels, may be transported to a licensed off-base facilities for proper disposal only if such transport is consistent with and appropriate under the limitations for off-site disposal as established by CERCLA, the NCP, and the U.S. EPA's off-site policy for off-site response actions. Appropriate state and local officials have been notified of the intended removal action and ultimate disposal of the treated groundwater, and have concurred with the action.

Contribution to Remedial Performance

The proposed actions will minimize further migration of higher concentrations of contaminants (exceeding 100 µg/L) into larger, presently unaffected, volumes of groundwater. Removing these higher concentrations will allow for the continued use of BW-18. The more contaminated groundwater is the threat that requires the most immediate attention before long-term cleanup begins. At its current pumping rate, BW-18 controls much of the groundwater flow in OU B, and controls contaminant migration.

Properly abandoning the five base supply wells (BW-3, BW-6, BW-17, BW-19, and an unnumbered well) will slow the vertical migration of contaminants from shallower zones to deeper ones if the well screens cross zone boundaries.

Remedial actions for OU B have not yet been formulated. While the sources for the northern TCE/1,2-DCE plume are apparently to the north of OU B, such remedial actions might include source control measures, as well as migration control measures. Further groundwater extraction systems may be installed; technologies such as subsurface barriers will generally be considered inappropriate. The OU B RI/FS will further characterize the nature and extent of contamination in OU B, and evaluate possible remedial actions.

Description of Alternative Technologies

Technologies that did not involve the extraction, treatment, and effluent disposal and/or use were considered inappropriate and eliminated from the evaluation.

EE/CA-EA

Removal action alternatives were evaluated in the OU B EE/CA-EA (Radian, 1991). Alternatives to extraction wells were eliminated because of the depth from which it is necessary to contain the movement of contaminated groundwater with barriers. Alternative treatment systems included air stripping, aqueous GAC, and UV/ozone/peroxide treatment at a local treatment plant; piping to the Groundwater Treatment Plant; and no treatment. Disposal alternatives included discharging to the IWL, sanitary sewer, to surface water, or reinjection. A no action alternative was also evaluated, as required by the EA.

Shutting down BW-18 was considered; however, this was eliminated because of the beneficial control the well exerts on the aquifers, and because of the theoretical risks to CW-132 that would develop.

The discussion and evaluation of the alternatives in the EE/CA-EA is hereby incorporated by reference.

ARARs

The ARARs considered appropriate to groundwater remedies evaluated for the McClellan AFB OU B removal actions are the ones associated with potential groundwater treatment and disposal actions, and managing treatment residuals. The ARARs that have been identified for the northern TCE/1,2-DCE plume actions are:

- Clean Air Act Primary and Secondary Ambient Air Quality Standards;
- National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act;
- National Ambient Air Quality Standards (NAAQS);
- National Emissions Standards for Hazardous Air Pollutants;
- California Ambient Air Quality Standards; and

- Sacramento Metropolitan Air Quality Management District Requirements.
- California Water Quality Criteria

The selected action will comply with the identified ARARs to the maximum extent practicable under the exigencies of the situation. These actions will be protective of human health and the environment.

Project Schedule

Construction of the extraction wells and pipeline to the OU C extraction system will take less than one year to complete.

5.2.2 Estimated Costs

Costs for the pipeline to the GWTP, including the extraction and monitoring wells, are estimated to be approximately \$593,000 in capital costs and \$29,000 annually for operations and maintenance.

Abandonment of the five water supply wells is estimated to cost an average of \$26,600 each, for a total of \$133,000.

5.3 Southern TCE/1,2-DCE Plume Actions

The southern TCE/1,2-DCE plume is that portion of the plume extending south of an imaginary east-west line running through BW-18. It is distinguished from the northern TCE-1,2-DCE plume by its lower VOC concentrations (less than 100 µg/L).

5.3.1 Proposed Actions

Proposed removal actions are:

- Use CW-132 for emergencies only;
- Implement the removal actions for the TCE/PCE and northern TCE/1,2-DCE plumes, including the continued operation of BW-18;

- Properly abandon CW-150, a well already contaminated with VOCs; and
- Install three monitoring wells south of McClellan AFB, and monitor 10 monitoring wells south of McClellan AFB quarterly.
- Continue sampling and analyzing groundwater to monitor effectiveness of the extraction systems, migration of the contaminated groundwater, and develop information for long term remediations.

The proposed actions will minimize health risks to users of water from CW-132; prevent higher concentrations of VOCs in the TCE/1,2-DCE plume from migrating further south, thereby contaminating larger volumes of groundwater; slow the vertical migration of contaminants; and allow for the monitoring and reevaluation of the plume during the OU B RI/FS.

The removal actions for the TCE/PCE plume and the northern TCE/1,2-DCE plume are integral to the removal action for the southern TCE/1,2-DCE plume actions. The two extraction systems for the other plumes will prevent contaminants from migrating further, and contaminating larger volumes of groundwater--or of increasing the contaminant concentrations in the southern TCE/1,2-DCE plume. Similarly, the continued operation of BW-18 will control contaminant migration. Base Well 18, which currently pumps about one million gallons per day, draws back much of the contaminated groundwater in the southern TCE/1,2-DCE plume, thereby preventing contaminants from migrating farther.

Although no groundwater contaminants were ever detected in CW-132 in analyses ordered by the County of Sacramento, the removal action proposes to use the well for emergencies only. In fact, the well has already been reduced to emergency use at the request of the Air Force. Any future potential health risks associated with using water from the well have, therefore, been greatly reduced.

Groundwater from CW-150, on the other hand, was found to contain detectable concentrations of VOCs and, in 1982, the well was reduced to emergency use only. This well is screened in four geohydrologic zones (B, C, D, and E) and is

therefore a potential conduit for vertical migration of contaminants. Proper abandonment of CW-150 will slow the vertical migration of contaminants.

The three proposed monitoring wells, together with monitoring wells already installed in OU B, will provide data on the migration and extent of the contaminant plumes. Samples will be analyzed quarterly by U. S. EPA Methods 8010, 8020, and 6010.

The proposed actions are appropriate for the southern TCE/1,2-DCE plume because:

- They will control the migration of the northern portion of the plume, and prevent higher concentrations of contaminants from migrating further;
- The low levels of contamination in most of the plume;
- No one is using groundwater from the southern portion of OU B (BW-18 is the only active water supply well in OU B); and T
- The contaminants will not reach any other active water supply wells for approximately 60 years, assuming no remediation steps are taken and that dilution of the contaminant plume will not occur.

Further actions for the southern TCE/1,2-DCE plume will be evaluated in the OU B RI/FS that will follow the EE/CA-EA action.

Off-site disposal of treated groundwater is not required for this plume.

Contribution to Remedial Performance

Remedial actions for the southern TCE/1,2-DCE plume have not been formulated. Removal actions taken for the plume are intended to prevent higher concentrations of VOCs from migrating horizontally or vertically to larger volumes of groundwater. The monitoring wells will also provide information necessary for developing any long-term remedial actions.

Potential remedial actions for the southern TCE/1,2-DCE plume include further extraction and treatment systems, and in-situ remediation, if an acceptable

technology is available. The OU B RI/FS will further characterize the nature and extent of contamination in OU B, and evaluate possible remedial actions. In the meantime, the removal actions for the TCE/PCE and the northern TCE/1,2-DCE plumes will abate threats to human health sufficiently to allow remedial action plans to be developed.

EE/CA-EA

A discussion of removal action alternatives, including a no action alternative, is included in the EE/CA-EA for OU B (Radian, 1991). That discussion and evaluation is hereby incorporated by reference.

ARARs

The ARARs considered practicable for the removal actions for the southern TCE/1,2-DCE plume are those associated with groundwater treatment and disposal, and managing treatment residuals. The ARARs thus identified are listed in Sections 5.1.1 and 5.2.1, above.

Schedule

Construction of the monitoring wells for the southern TCE/1,2-DCE plume should be completed by late 1991. Schedules for the implementation of the removal actions for the TCE/PCE and northern TCE/1,2-DCE plumes are listed in Sections 5.1.1 and 5.2.1, respectively, above. Abandonment of CW-150 was completed in April 1991.

5.3.2 Estimated Costs

Monitoring well construction is estimated to cost \$13,000 for the A zone well, \$18,000 for the B zone well, and \$24,000 for the C zone well.

Abandonment of CW-150 is estimated to cost \$26,600.

5.4 PCE Plume Actions

Tetrachloroethene (PCE) has been detected in groundwater without TCE present in two wells in OU B.

5.4.1 Proposed Actions

Proposed actions for the PCE plume are:

- Continue to pump BW-18 to hydrologically control the direction of plume migration;
- Implement the removal actions for the TCE/PCE and northern TCE/1,2-DCE plumes; and
- Determine the source and extent of the PCE plume in the OU B RI.

Only limited information is available concerning the extent and nature of the PCE plume. Therefore the removal actions proposed for this plume focus on controlling migration of the known extent of the plume. The continued pumping of BW-18 will tend to draw the contaminants toward it, rather than allowing the PCE to migrate off base. The removal actions for the TCE/PCE and northern TCE/1,2-DCE plumes, in turn, will allow BW-18 to continue operating.

The OU B RI/FS will characterize the nature and extent of the plume, and evaluate appropriate remedial actions for the PCE plume.

Off-site disposal is not required for this plume.

Contribution to Remedial Performance

Remedial actions for the PCE plume have not been formulated. By preventing the contaminants in the plume from migrating further, the proposed removal actions will reduce the need to extract larger volumes of groundwater later on.

Potential remedial actions for the PCE plume include both source control and migration control measures. These could include further extraction systems, or in situ remediation if an acceptable technology is available. The OU B RI/FS will further characterize the nature and extent of contamination in OU B, and evaluate possible remedial actions.

Description of Alternative Technologies

Various technologies addressing the PCE plume will be evaluated in the upcoming OU B RI/FS.

EE/CA-EA

The EE/CA-EA for OU B (Radian, 1991) includes a discussion and evaluation of removal action alternatives for the PCE plume. That discussion and evaluation are hereby incorporated by reference.

ARARs

The ARARs considered practicable for the PCE plume removal actions are those associated with groundwater treatment and disposal, and managing treatment residuals. The ARARs thus identified are listed in Sections 5.1.1 and 5.2.1, above.

Schedule

Implementation of the removal actions for the TCE/PCE plume began in September 1990, and will begin for the northern TCE/1,2-DCE plume in May 1991. Further PCE plume actions will be evaluated and implemented as is appropriate during the OU B interim remedial action.

5.4.2 Estimated Costs

No costs have been developed specifically for potential removal actions for the PCE plume. Costs for implementation of removal actions for the TCE and northern TCE/1,2-DCE plume are listed in Sections 5.1.1 and 5.2.1, respectively, above.

**6.0 EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE
 DELAYED OR NOT TAKEN**

If the actions described herein are delayed or not taken, the contaminants in groundwater will continue to migrate. The near-term effect of no action may include the loss of Base Well 18 (BW-18) as the primary water supply well for McClellan Air Force Base (AFB), the contamination of City Well 132 (CW-132), and the spread of volatile organic compound (VOC) contamination to greater volumes of groundwater. If BW-18 were shut off because of high VOC concentrations, its benefit as a hydrologic sink would be lost, and a greater volume of contaminated water would migrate off base. In the long-term, additional city wells would be affected by increasing levels of contamination. All these conditions would result in greater remediation cost, a longer restoration time frame, and greater technical difficulties during subsequent remediation.

7.0 OUTSTANDING POLICY ISSUES

No outstanding policy issues are identified with these sites.

8.0**DETERMINATIONS AND APPROVAL MEMORANDUM**

This decision document represents the selected removal action for ground-water in Operable Unit B of McClellan Air Force Base, California, developed in accordance with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by Superfund Amendments and Reauthorization Act (SARA), the Defense Environmental Restoration Program (DERP), the McClellan AFB Interagency Agency Agreement (IAG) and is consistent with the National Oil and Hazardous Substances Contingency Plan (NCP). This decision is based on the administrative record for the site.

Conditions at the site meet the NCP section 300.415(b)(2)(ii) criteria for a removal action. The selected removal actions will comply with identified applicable or relevant and appropriate requirements to the maximum extent practicable under the exigencies of the situation, be protective of human health, welfare, and the environment, and contribute to the efficient performance of any long-term remedial action with respect to the releases, and are therefore recommended.

I have reviewed the Action Memorandum and the removal actions identified and selected herein, and the actions are hereby:

Approved

Disapproved

Michael D. Pavich
Major General, USAF
Commander
Sacramento Air Logistics Center
McClellan AFB, California

Michael D. Pavich
Major General, USAF
Commander
Sacramento Air Logistics Center
McClellan AFB, California

9.0

REFERENCES

Department of the Air Force, 23 January 1990. Proposal Notification for an Expedited Removal Action near Building Site 666 in the Groundwater Operable Unit B, McClellan AFB. Correspondence from McClellan AFB EM to Department of Health Services, U.S. Environmental Protection Agency, and Regional Water Quality Control Board.

40 Code of Federal Regulations (CFR) 300.415

Radian, 1990a. "Installation Restoration Program Stage 5, Area B Groundwater Operable Unit Remedial Investigation: Technical Report." Draft. Prepared for Headquarters, AFLC/DEV, Wright-Patterson AFB, Ohio. June.

Radian, Corporation, 1990b. "Comprehensive CERCLA Workplan." Prepared for McClellan AFB/EM, McClellan AFB, California, 95652-5990.

Radian Corporation, 1990c. "Installation Restoration Program Stage 3, Operable Unit B Preliminary Assessment Summary Report." Draft. Prepared for McClellan AFB/EM, McClellan AFB, California, 95652-5990. April.

Radian Corporation, 1991. "Operable Unit B Engineering Evaluation/Cost Analysis-Environmental Assessment." Draft. Prepared for McClellan AFB/EM, McClellan AFB, California, 95652-5990. February.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY
OPERABLE UNIT B
ENGINEERING EVALUATION/COST ANALYSIS-ENVIRONMENTAL ASSESSMENT
AND REMOVAL ACTION
McCLELLAN AIR FORCE BASE, CALIFORNIA

OVERVIEW

McClellan Air Force Base (AFB) conducted an Engineering Evaluation/Cost Analysis - Environmental Assessment (EE/CA-EA) to evaluate different removal action alternatives for groundwater in Operable Unit (OU) B. Contaminated groundwater beneath that portion of McClellan AFB had been found to be migrating toward two water supply wells. Three plumes of contaminated groundwater had been identified: a trichloroethene/tetrachloroethene (TCE/PCE) plume, a TCE/1,2-dichloroethene (TCE/1,2-DCE) plume, and a PCE plume. For purposes of the removal actions, the TCE/1,2-DCE plume was divided into two sections, north and south, based on location, depth, and contaminant concentrations. The EE/CA-EA evaluated various contaminated groundwater extraction and treatment technologies. Alternatives proposed for implementation may be summarized as follows:

- For the TCE/PCE plume, installation of two extraction wells and construction of a nearby aqueous-phase carbon adsorption treatment plant, which would discharge effluent to the McClellan AFB Industrial Wastewater Line.
- For the northern TCE/1,2-DCE plume, installation of three extraction wells and construction of a pipeline to the McClellan AFB Groundwater Treatment Plant (GWTP), which discharges treated effluent into Magpie Creek. Because of the length of time needed to construct the pipeline (one to three years), an interim action was also proposed, which involved piping untreated groundwater directly to the on-base sanitary sewer line. From there, the water would be piped to the Sacramento Regional County Sanitation District (SRCSD).
- For all plumes, the continued pumping of Base Well 18, for the hydrologic control it exerts on the groundwater, and the

abandonment of five unused water supply wells that could be acting as conduits for vertical migration of contaminants.

- Construction of two groups of monitoring wells, to monitor the effectiveness of the extraction systems and the migration of the plumes.
- For all plumes, periodic sampling and analyses of monitoring wells to evaluate effectiveness of the extraction system, migration of the contaminated groundwater, and to develop information for long term remedial actions.
- Reevaluation of the need for further removal actions during the OU B Remedial Investigation, scheduled to begin in May 1991.

The primary criteria used to select the removal actions were the protection of human health, welfare, and the environment, compliance with applicable or relevant and appropriate requirements (ARARs), and consistency with the ultimate remedial action. The selection of each proposed action was made on the basis of implementability, effectiveness in treating the types of contaminants found in the groundwater, and preliminary engineering and cost estimates. The proposed actions were identified and developed with extensive Federal, State, and local regulatory review and coordination, and could be constructed and operated in compliance with all applicable Federal, State, and local requirements.

During the scoping and drafting of the OU B EE/CA-EA, the U.S. Environmental Protection Agency (U.S. EPA), the California Department of Health Services (DHS), and other appropriate state and local agencies were consulted and commented on the proposed removal actions. These agencies have reviewed the EE/CA-EA and have concurred with the proposed and selected removal actions.

Responses to solicitations for public comments expressed concern over the proposed interim solution for the northern TCE/1,2-DCE of discharging the extracted contaminated groundwater to the SRCSD sewer system. While there were no regulatory prohibitions, the commentors believed that other groundwater treatment or discharge alternatives were more appropriate. All commentors argued for treating extracted groundwater prior to discharge. Under the proposed final solution, extracted

groundwater would be piped to the existing GWTP for treatment and then discharged to Magpie Creek.

SUMMARY OF COMMENTS RECEIVED

McClellan AFB solicited comments from the community on the cleanup methods proposed in the OU B EE/CA-EA. A public notice announcing an open house and the public comment period was placed in the *Sacramento Bee* on 08 January 1991. An open house was held on 16 January 1991 to discuss the selection of the OU B EE/CA-EA response actions, to answer questions, and to accept oral and written comments. The public comment period, which ran from 01 February through 02 March 1991, provided an opportunity for public participation in the selection process. The comment period was extended by 15 days at the request of Mrs. Mary R. Fisher of the McClellan Ecological Seepage Situation. During the public comment period, written comments were received from the following individuals and interested groups:

- National Toxics Campaign Fund;
- McClellan Ecological Seepage Situation; and
- Charles H. Yarbrough, McClellan AFB Task Force Member.

The Honorable Lloyd G. Connelly, Assemblymember, 6th District, added his support to Mr. Yarbrough's comments.

Each of the public comments received focused on the proposed interim solution for the northern TCE/1,2-DCE plume of discharging the extracted contaminated groundwater to the Sacramento Regional County Sanitation District (SRCSD) sewer system. While there were no regulatory prohibitions, the commentators believed that other groundwater treatment or discharge alternatives were more appropriate. Specific concerns associated with discharging groundwater to the sanitary sewer system included:

- Potential exfiltration from the sewer lines;
- Lack of capable treatment for VOCs at the SRCSD treatment facility;
- Higher than estimated concentrations of contaminants in the extracted groundwater;

- Dilution of the contaminated groundwater with other waste streams to within drinking water standards;
- Delays in constructing the pipeline to the GWTP;
- Beneficial use of SRCSD treatment plant effluent and sludge that contains hazardous wastes;
- Proliferation of contaminated groundwater discharges to publicly owned treatment works (POTWs);
- Commingled contaminated waste streams from McClellan AFB and the County of Sacramento sewage dumping station adjacent to the base;
- Transferring groundwater contamination to other environmental media;
- Potential air emissions from volatilization of the contaminants within sewer lines and at the SRCSD treatment plant; and
- Discharge of effluent containing contaminants not removed by the SRCSD treatment plant

In addition to the listed concerns, the commentors also suggested temporary local treatment of groundwater until the pipeline to the GWTP is completed.

While the interim action would have been fully protective of human health, welfare, and the environment, the Air Force has decided to bypass the interim action, and proceed on an expedited basis to the final action without prejudice to potential, future response actions that might utilize the option of discharge to the sanitary sewer line. The reasons for this decision include:

- A reassessment of the technological feasibility of implementing the final action (it has been determined that the pipeline to the GWTP can be built in a matter of months, as opposed to the one to three years that were initially estimated);

- Concerns voiced during the public comment period; and
- Considerations of cost effectiveness and maximum use of treatment technologies to reduce the volume, toxicity, and mobility of contaminants to the maximum extent practicable.